

WIEB - CEC Natural Gas Workshop

Scenarios and Sensitivities



Presented by
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***"Forecasting is difficult . . . especially
about the future."***

-- Bob Fourer, Northwestern University

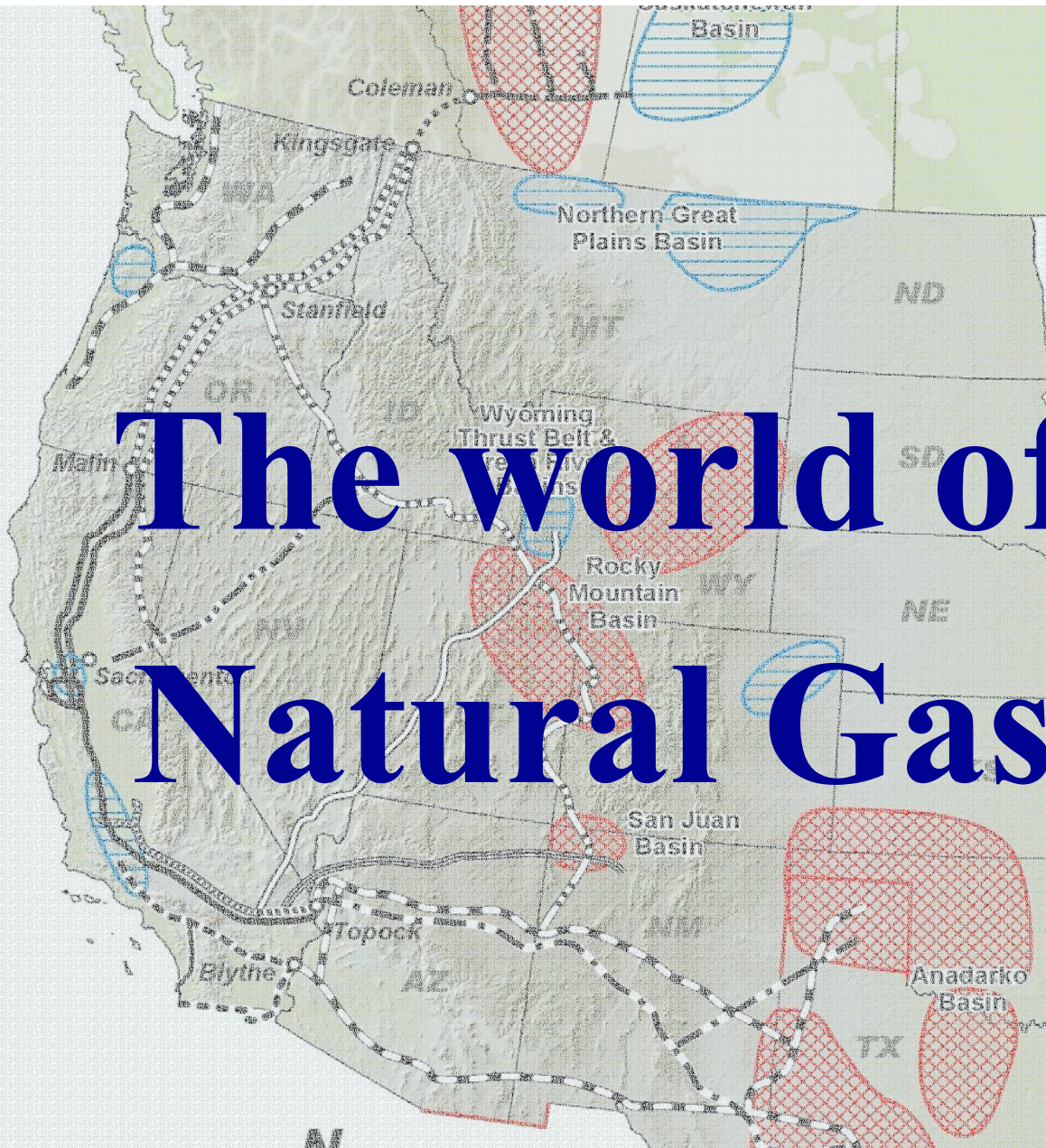


Topics

- Need for scenarios and sensitivities
- What are the other crystal Balls showing?
- How should we select our crystal ball?
- What do you want our crystal ball to say?
- How can you help us in this process?



The world of Natural Gas





Overall Picture

- Integrated natural gas market place
 - Interconnected pipelines. Price and supply effects ripple throughout US and Canada
- Changes in the market place:
 - Bursting of the gas bubble
 - Electricity restructuring
 - Natural gas - electricity convergence - a new paradigm?
 - Electricity generation race



Scenarios - Testing the Boundaries

- Address a variety of outcomes - both possible and plausible
- Integrated outlook to address impact of combination of events

key elements of scenarios:

**market characteristics \cap forces of change \cap uncertainties
combined with the possible paths of development.**



Drivers of gas price

Demand

- Technology impacts
- Reserve appreciation
- Demand projections
- Weather impacts
- Economic factors

Supply

- Supply-cost curves
- Technology impacts
- Reserve appreciation
- Discount rates
- LNG supplies
- Economic factors
- Competitive markets
- Alternative fuels

Infrastructure

- Infrastructure capacity
- Pipeline constraints
- Storage access
- Technology impacts
- Economic factors
- Competitive markets



Approach to Uncertainty

- Sensitivities to address impacts of individual variables
- Scenarios to test the bounds of our imagination
- Integrated market outlook to bound the expectations of gas price variations

Scenarios and Sensitivities

- run off a reference case



Supply Based

- Low supply resources
- LNG on the west coast

Demand Based

- Dry hydro case
- High / Low econ cases
- Higher / Lower PGC impacts
- Very high use in transportation

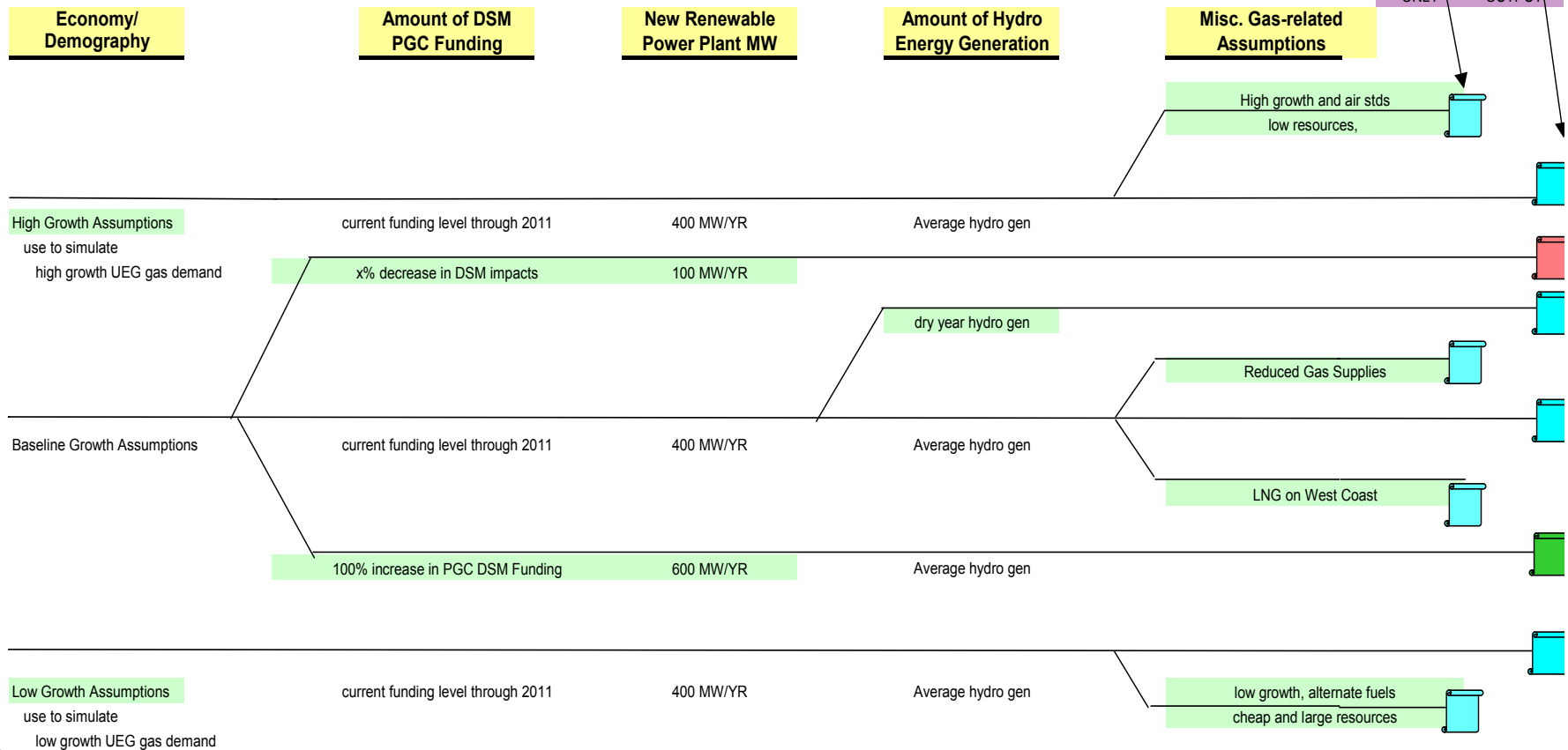
Integrated Supply and Price Outlook Scenarios

- Factors tending to raise prices - High price boundary
- Factors that lower prices - Low price boundary

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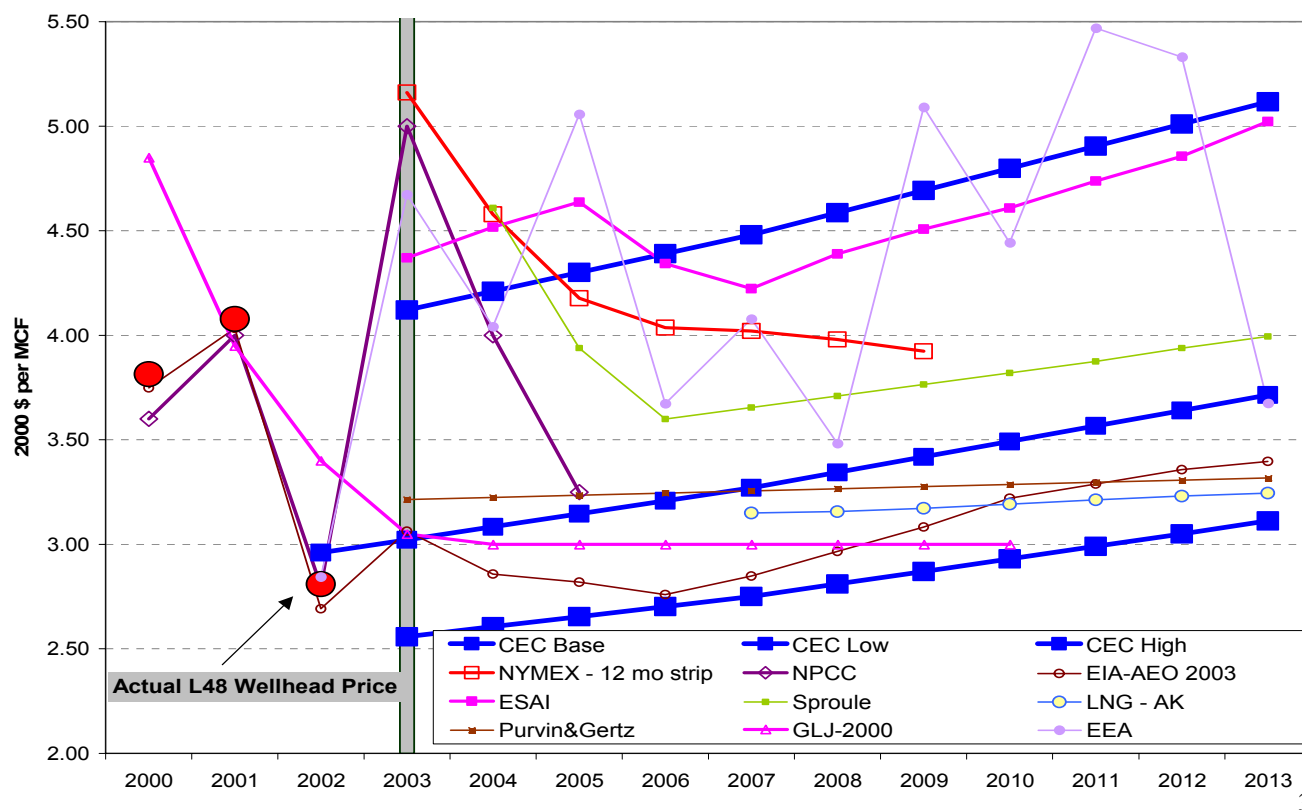
Design and Scope of the E&NG Assessment Scenario Analysis





2003 IEPR Observations

Comparison of L48 Wellhead prices with CEC Forecast





Sensitivities

Demand Sensitivities

- Temperature / Hydro
- Sustained higher demand
- Sustained lower demand

Supply Sensitivities

- Low Gas Supply
- Higher amount of Resources
- LNG on the West Coast

Transportation Sensitivities

- Pipeline expansions and costs
- LNG access and interconnections
- New (potential) pipelines



Scenarios

Specific scenarios - Combination of sensitivities to project outcomes, such as

- **Low rainfall with a cold winter combined with high low economic factors or limited or extended DSM and efficiency programs.**
- **Problematic issues with getting LNG combined with a high demand across the US**

Integrated Market Supply Outlooks:

- **Factors tending to raise prices - High price boundary**
- **Factors that lower prices - Low price boundary**



***Thank you,
questions?
input?***